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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/677,913	10/01/2003	Dennis M. O'Connor	P17474	9573
25694	7590	02/20/2008		
INTEL CORPORATION C/O INTELLEVATE, LLC P.O. BOX 52050 MINNEAPOLIS, MN 55402			EXAMINER ZHE, MENG YAO	
			ART UNIT 2195	PAPER NUMBER
			MAIL DATE 02/20/2008	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/677,913

Applicant(s)

O'CONNOR ET AL.

Examiner

MENG YAO ZHE

Art Unit

2195

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 16 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-3,6-14 and 16-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,6-14 and 16-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/ are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

1. Claims 1-3, 6-14, 16-27 are presented for examination.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 7, 9, 10-14, 16-20, and 22-24 are rejected under 35 U.S.C. 102(e) as being anticipated by Horvitz Patent No. 6,009,452, 12/28/1999 (hereafter Horvitz).

4. As per claims 1, 11, 13, 16-20, 22-24, Horvitz teaches a method, comprising:

Examining an instruction stream of a non-executing thread during execution of an executing thread (Column 11, lines 24-26; Column 19, lines 18-25, lines 40-60; Fig 4);

Identifying an instruction in the instruction stream (Column 17, lines 52-54);

Identifying hardware resources in the instruction stream (Column 17, lines 62-67);

Identifying hardware resources associated with the instruction (Column 17, lines 62-67);

Determining whether the hardware resource is available to the instruction of the non-executing thread (*Column 17, lines 45-56; 62-67*);

enabling execution of a non-executing thread based at least on whether a hardware resource is or will be available to an instruction of the non-executing thread. (*Column 17, lines 45-55*)

5. As per claims 2, 14, Horvitz teaches

further comprising switching from the execution of a thread executing an instruction with long or potentially long latency, to the execution of the non-executing thread if the hardware resource is or will be available to the instruction of the non-executing thread. (*Column 9, lines 5 to 66: during idle time, when a current executing task is waiting on another resource, Horvitz's invention would bring in a pending task for execution in order to utilize the CPU down times.*)

6. As per claims 3, Horvitz teaches

further comprising switching from the execution of an executing thread to the execution of the non-executing thread if the hardware resource is or will be available to the instruction of the non-executing thread. (*Column 9, lines 5 to 66*)

7. As per claim 7, Horvitz teaches

wherein enabling comprises enabling execution of the non-executing thread based on whether a functional unit is or will be available to the instruction of the non-executing thread (*Column 9: The CPU is a functional unit.*)

8. As per claim 9, Horvitz teaches

enabling execution of a second non-executing thread if the hardware resource is available to the instruction of the non-executing thread (*Column 10, lines 5 to 30: All unexecuted task instances may be executed. Only the one with higher probability will be executed sooner than the one with the lower probability.*)

9. As per claim 10, Horvitz teaches

further comprising switching from executing at least two executing threads to executing the non-executing thread and at least one other non-executing thread if the hardware resource is available to the instruction of the non-executing thread. (*Column 10, lines 5 to 30: The Examiner has interpreted claim 10 as switching execution of two threads to execution of two other waiting threads. The Examiner also points out that true, complete concurrent execution of threads is impossible. Horvitz discloses idle time of CPU while other tasks are waiting. Therefore any tasks that are waiting are considered to be the executing threads.*)

*All unexecuted task instances may be executed. Only the one with higher probability will be executed sooner than the one with the lower probability. So two task instances l's are considered to be the two waiting threads.)*

10. As per claim 12, Horvitz teaches

determining the number of hardware resources unavailable to a second pending thread and wherein switching comprises switching from the first executing thread to the first pending thread if the number of unavailable hardware resources to the first pending thread is less than the number of unavailable hardware resources to the second pending thread. *(Column 11, lines 40 to 60, Column 14, lines 25 to 60: Horvitz teaches signing priorities to waiting tasks based on delayed future availability and how dependent the tasks are. As of result, those pending task with a less wait time, thus a higher priority, gets executed before those with a lower priority.)*

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horvitz Patent No. 6,009,452, 12/28/1999 (hereafter Horvitz), in view of Budde et al., Patent No. 4,891,753, 1/2/1990.

13. As per claim 6, Horvitz does not teach

wherein enabling comprises enabling execution of the non-executing thread based on whether the hardware resource is scoreboarded.

However Budde teaches enabling execution of the non-executing thread based on whether the hardware resource is scoreboarded for the purpose of not wasting idle times of a resource. (*Column 1*)

It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention to have modified the invention of Horvitz with

enabling execution of the non-executing thread based on whether the hardware resource is scoreboarded, as taught by Budde, because idle times of a resource would not be wasted this way.

14. As per claim 8, Horvitz teaches all of claim 1 and

enabling execution of the non-executing thread if the hardware resource is available to the instruction of the non-executing thread

Horvitz does not specifically specify

not enabling execution of the non-executing thread if the hardware resource is unavailable to the instruction of the non-executing thread.

However, Budde teaches

not enabling execution of the non-executing thread if the hardware resource is unavailable to the instruction of the non-executing thread for the purpose of not wasting idle times of a resource. (*Column 1*)

It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention to have modified the invention of Horvitz with

not enabling execution of the non-executing thread if the hardware resource is unavailable to the instruction of the non-executing thread

as taught by Budde, because idle times of a resource would not be wasted this way.

15. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horvitz.

16. As per claim 21, Horvitz teaches all of claim 16 and a look up table, which is the equivalent of a register lookup. Horvitz is silent to the apparatus of claim 16 having specifically

an instruction cache,



instruction decoder,

a register lookup.

However, Horvitz does disclose a CPU (Figure 5, unit 540). It is well-known and recognized in the art that an instruction cache is used in a CPU to bring up instructions for execution.

Horvitz also discloses an operating system (Figure 6, unit 610). It is well-known and recognized in the art that a register lookup is used in an operating system to bring up data and instructions for execution.

Horvitz also discloses a word processing program (Column 24, line 39) as an example of a task. It is well-known and recognized in the art that a word processing program is written with higher programming language, and in order to be ultimately executed, a compiler is needed to compile a higher language program into lower machine language. The Examiner has considered the compiler to be an instruction decoder.

17. Claims 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horvitz Patent No. 6,009,452, 12/28/1999 (hereafter Horvitz), in view of Dukach et al., Pub No. US 2004/0036622, 2/26/2004 (hereafter Dukach).

18. As per claim 25-27, Horvitz does not teach an antenna.

However, Dukach teaches a wireless phone with an antenna (*Figure 18, unit 340 and 342*) with a processor for the purpose of controlling the execution of various tasks for the cell phone (*Paragraph 161*)

It would have been obvious to one having ordinary skill in the art at the time of the applicant's invention to have employed the invention of Horvitz on a cell phone with an antenna, as taught by Dukach, because it allows for the control over the execution of various tasks for the cell phone.

### ***Response to Arguments***

19. Applicant's argument filed on 11/16/2007 regarding claims 1-27 have been fully considered but are not persuasive.

20. In the remark applicant argued in substance that:

i) Horvitz does not teach examining an instruction stream of a non-executing thread DURING execution of an executing thread.

21. The Examiner respectfully disagree with the applicant, as to point

i) Horvitz does teach examining a non-executing thread during execution of an executing thread in the specific third scenario he describes in column 11, lines 24-26, where optimal use of processing time may be used to precompute and analyze future tasks during any period, including periods when other executing threads are executing. More specifically, as stated in column 19, lines 17-25, lines 40-60 and further illustrated in Fig 4, the comparison between the EVC of

an executing thread and a non-executing thread may be analyzed at any time interval, including the interval when the executing thread is executing. Thus a non-executing thread may be examined and analyzed during execution of a executing thread.

### ***Conclusion***

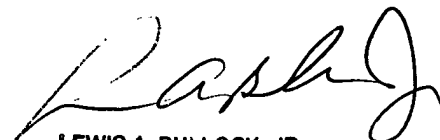
22. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MengYao Zhe whose telephone number is 571-272-6946. The examiner can normally be reached on Monday Through Friday, 10:00 - 8:00 EST. If attempts to reach the examiner by telephone are unsuccessful, the examiner's

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supervisor, Meng-Ai An can be reached at 571-272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

A handwritten signature in black ink, appearing to read "L. Bullock, Jr.", with a stylized flourish at the end.

**LEWIS A. BULLOCK, JR.**  
**PRIMARY EXAMINER**